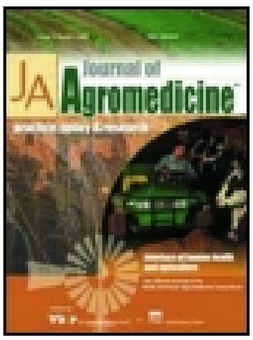

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Respirator Use and Practices in Agricultural Crop Production Establishments

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BRIEF REPORT

Respirator Use and Practices in Agricultural Crop Production Establishments

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ABSTRACT. The risk of developing respiratory diseases can be reduced by either wearing respiratory protection under the guidance of an effective respiratory protection program or using controls. In 2001, the *Survey of Respirator Use and Practices* gathered information on the types of respirators used, respirator use practices, and the respirator program characteristics from 40,002 randomly selected US establishments. This report presents findings of the Survey of Respirator Use and Practices for the Agricultural Production—Crops industry and compares them with National Institute for Occupational Safety and Health (NIOSH) recommendations. Approximately one third of all *Agricultural Production—Crops* establishments required respirator use. Of the *Agricultural Production—Crops* establishments that required respirator use, (1) a written program to determine what type of respirator to use was not adopted by management in 73% of the establishments; (2) 21% did not know whether air sampling was conducted for substances for which employees were required to use respirators; (3) 29.5% did not provide respirator training for employees; (4) employees were not assessed for medical fitness to wear a respirator or it was not known whether the employees were assessed, in 49.4%; and (5) the program administrator had received no respirator training in 29.5%. Of the *Agricultural Production—Crops* establishments that required respirator use, 69.5% had at least 3 indicators of a potentially inadequate respiratory protection program. The high rates of indicators of potential inadequacies suggest widespread problems with respiratory protection programs in the *Agricultural Production—Crops* industry, indicating a potential for improvement.

KEYWORDS. Agriculture, respirators, respiratory system disorders

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The findings and conclusions in this report are those of the authors and do not necessarily represent the views of the National Institute for Occupational Safety and Health.

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INTRODUCTION AND METHODS

In 2001, the *Survey of Respirator Use and Practices* gathered information on respirator use from 40,002 randomly selected US establishments.[1] The *Survey of Respirator Use and Practices* collected data on the types of respiratory protection used by workers at an establishment, respirator use practices, and the presence of substances that prompted the decision to use respiratory protection. The publication *Respirator Usage in Private Sector Firms, 2001*[1] offers a detailed description of the *Survey of Respirator Use and Practices* methodology and results.

Agricultural Production—Crops workers have an increased risk of developing histoplasmosis,[2,3] asthma,[2,4–8] and hypersensitivity pneumonitis.[2,9] Workers can reduce the risk of developing these respiratory diseases by either wearing respiratory protection under the guidance of an effective respiratory protection program or using controls (ie, pressurized cabs with filtration). For example, adequate personal respiratory protection has been shown to be protective against recurrent attacks of hypersensitivity pneumonitis.[10] This report presents findings of the *Survey of Respirator Use and Practices* for the *Agricultural Production—Crops* industry (Standard Industrial Classification code 01)[11] and compares them with National Institute for Occupational Safety and Health (NIOSH) recommendations.[12]

Limitations

The *Survey of Respirator Use and Practices* has limitations. Public sector, self-employed, and agriculture establishments with less than 11 workers were not surveyed. This limitation is important because approximately 21.8% of the *Agricultural Production—Crops* employees were working at establishments that had fewer than 11 employees in the year 2001.[13] Furthermore, approximately 75.2% of the *Agricultural Production—Crops* establishments employed fewer than 11 employees in 2001 and were therefore excluded from the survey coverage.[14] (For the purposes of this report, the phrase "*Agricultural Production—Crops* establishments" refers to establishments covered by the survey). Although the instructions stated that the person most familiar with respiratory protection should complete the questionnaire, this may not have always happened. In spite of cognitive and field testing the questionnaire at small, medium, and large establishments prior to its mailing, recipients might have misinterpreted the written questions. The *Survey of Respirator Use and Practices* was not designed to collect information regarding the type of substances for which respirators were most frequently used specifically for *Agricultural Production—Crops*. However, the type of substances for which respirators were most frequently used in *Agricultural Production—Crops* are included among those listed for its parent industry, *Agriculture, Forestry, and Fishing* (Figure 1). While the survey sample was randomly selected as representative of *Agricultural Production—Crops,* the sample did not necessarily include every crop grown in the United States. Bureau of Labor Statistics (BLS) reporting guidelines preclude disclosure of specific crops associated with the survey respondents.

RESULTS

Approximately one third (34%, or an estimated 4607 establishments) of all *Agricultural Production—Crops* establishments required respirator use.[1] While the *Survey of Respirator Use and Practices* design did not allow determination of particular substances that prompted respirator use within *Agricultural Production—Crops*, it did provide such information for its parent industry *Agriculture, Forestry, and Fishing*. Dust, vapors, paint vapors, cotton dust, welding fumes, and silica dust were the substances for which respirators were most frequently used in *Agriculture, Forestry, and Fishing* (Figure 1). Of the *Agricultural Production—Crops* establishments that required respirator use, approximately 69.5% had at least 3 indicators of a potentially inadequate respiratory protection program (Figure 2).

FIGURE 1. Estimated number of *Agriculture, Forestry, and Fishing* establishments using respirators to protect employees by indicated substances. *The category *dust* does not include *silica* and *cotton*. †The category *vapors* does not include *paint vapors*.

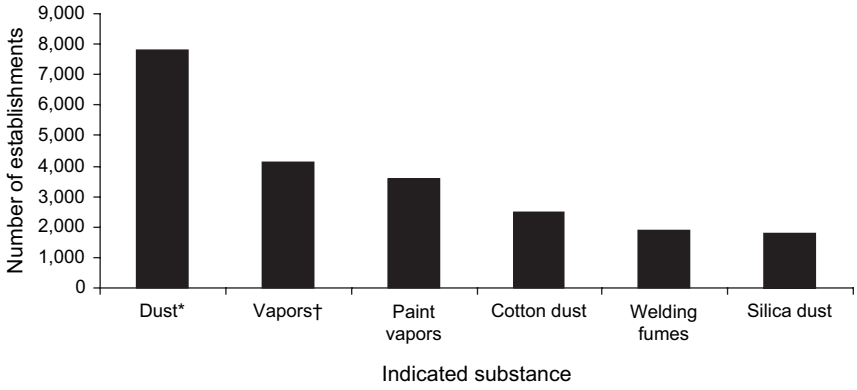
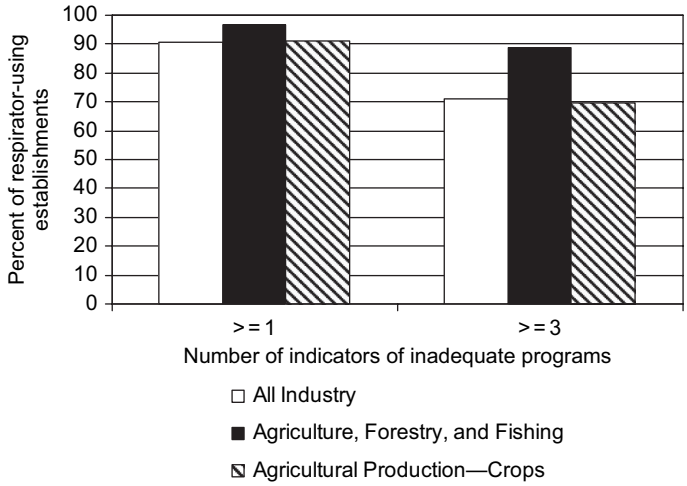


FIGURE 2. Percentage of respirator-using establishments with number of indicators of potentially inadequate respirator programs.



As shown in Table 1, the questionnaire responses provided by the establishments often contain indicators of potentially inadequate programs that are based on a NIOSH-recommended respirator program.[12] *Agricultural Production—Crops* establishments show lower rates for most of these indicators than *Agriculture, Forestry, and Fishing* establishments and private establishments as a whole. For most of the indicators, at least 20% of *Agricultural Production—Crops* establishments are potentially inadequate.

TABLE 1. Percentage of Respirator-using Establishments Reporting Selected Indicators of a Potentially Inadequate Respirator Protection Program*

Definition of Indicator	Percentage Rates of Indicator Occurrence Among Respirator-Using Establishments (lower is better)		
	All Industries Includes AgFF	AgFF Includes AgCrop	AgCrop
No written change-out schedule for establishments reporting use of air purifying gas/vapor filters	78.1	83.4	81.6
Improper method of setting air flow on airline respirators or do not know which method is used	77.2	95.8	—
No written procedure for deciding how respirators are used	65.5	83.6	73.0
No written procedures to periodically evaluate the effectiveness of respirator use or do not know whether such procedures exist	64.3	77.7	50.6
No assessment of the medical fitness of respirator-wearing employees or do not know whether an assessment is done	51.2	74.9	49.4
No written procedures and schedule for maintaining respirators or do not know whether such procedures exist	49.9	71.0	42.7
No fit-testing for wearers of tight-fitting respirators or do not know whether fit-testing is done	43.3	65.7	34.8
No trained respirator program administrator	41.9	49.4	29.5
No training for employees regarding respirator need, use, limitations, and capabilities	41.4	42.5	25.6
Used dust masks (disposable) to protect against gases or vapors	25.3	12.9	23.9
Airline respirator couplings are compatible with other gas systems or do not know about compatibility	23.7	42.9	—
No one assigned to be responsible for directing and overseeing the use of respirators	13.7	6.2	—
Did not know which method, or who was responsible for assessing employees' medical fitness, or did not know what method was used to fit-test employees	12.1	5.1	6.1
Did not know whether air sampling was conducted for substances for which employees were required to use either air-purifying or air-supplied respirators	4.6	7.9	21.0

**AgFF* indicates *Agriculture, Forestry, and Fishing*, AgCrop, *Agricultural Production—Crops;—*, data specific to AgCrop are not available because they do not meet BLS publication guidelines (industry estimates based on reports from fewer than 3 companies, relative standard error for an estimate exceeded a specified limit, or publication might disclose confidential information).

DISCUSSION

Each of the elements of a NIOSH-recommended respirator program listed in Table 1 is important to the quality of respirator programs.

The timely replacement of gas/vapor filters for air-purifying gas/vapor respirators is important because many substances do not have warning properties of taste or odor that would alert the wearer of the need to replace the filters. Filters have finite service times that can be very short for some substances. If an end-of-service-life indicator (ESLI) appropriate for conditions in the employer's workplace is not available, the employer must implement a change schedule for canisters and cartridges.[12] Without a change schedule, workers could unknowingly wear respirators having spent filters, thus deriving little or no protection, and putting themselves at risk. A written change schedule to replace filters was not provided for 81.6% of *Agricultural Production—Crops* establishments requiring air-purifying respirators with gas/vapor filters.

For airline respirators to meet NIOSH certification, the air flow must be controlled where

the air hose connects with the compressed air source and must be set according to the pressure given on the certification label or in the user's instructions.[12] The rate of air flow is essential if a wearer is to be provided adequate protection. Of all *Agriculture, Forestry, and Fishing* establishments requiring the use of airline respirators, 95.8% apparently used improper methods of setting air flow on airline respirators or did not know which method was used.

The quality of respirator use guidance available at an establishment is important to worker protection. Federal guidelines recommend the employer to establish and implement a written respiratory protection program with worksite-specific procedures and elements for required respirator use.[12] Lack of a written program could easily lead to inadequate protection for employees. A written program adopted by management was not used in 73% of the *Agricultural Production—Crops* respirator-using establishments to determine what type of respirator to use (Table 1).

Another critical feature of a respirator program is the proper selection of respirator type. Proper selection requires evaluation of ambient workplace air sample results from the establishment, preferably, or from another establishment with very similar operating conditions. Air sampling results indicate the concentration of airborne contaminants, and this information can help the program administrator determine the type of respirator needed to protect the workers. Of *Agricultural Production—Crops* establishments requiring respirator use, 21% did not know whether air sampling was conducted for substances for which employees were required to use either air-purifying or air-supplied respirators.

NIOSH recommends that the employer provide effective training for employees who are required to use respirators so they understand the need, use, limitations, and capabilities of the respirators they wear.[12] Of *Agricultural Production—Crops* establishments requiring respirator use, 29.5% did not provide training for employees regarding respirator need, use, limitations, and capabilities. This raises a question as to whether the workers are properly informed about respiratory protection.

The provision for medical screening of workers who may be required to use respirators is important because some workers may not be able to accommodate the greater level of exertion required when wearing some respirators.[15] NIOSH recommends that the employer provide a medical evaluation to determine the employee's fitness to use a respirator in the conditions for which they are required before the employee is fit-tested or required to use the respirator in the workplace.[12] Employees were not assessed for medical fitness to wear a respirator or it was not known whether the employees were assessed for medical fitness to wear a respirator in nearly half (49.4%) of *Agricultural Production—Crops* establishments where respirators were required.

It is critical that fit-testing be conducted to ensure that wearers of tight-fitting respirators receive the appropriate protection while working with toxic and potentially lethal substances. Before an employee is required to use any respirator with a negative- or positive- pressure tight-fitting facepiece, NIOSH recommends that the employee be fit-tested.[12] All tight-fitting respirator wearers were not fit-tested or it was not known whether the tight-fitting respirator wearers were fit-tested in 65.7% of all *Agriculture, Forestry, and Fishing* establishments requiring respirators and 34.8% of *Agricultural Production—Crops* establishments requiring respirators.

NIOSH recommends that the employer designate a single program administrator who is qualified, by appropriate training or experience, to administer or oversee the respiratory protection program and evaluate the program's effectiveness.[12] No single person was designated in approximately 6.2% of all *Agriculture, Forestry, and Fishing* establishments requiring respirators. The program administrator had received no training in approximately 49.4% of all *Agriculture, Forestry, and Fishing* establishments requiring respirators and 29.5% of *Agricultural Production—Crops* establishments requiring respirators.

The wearers of airline respirators would be in imminent danger if an airline were inadvertently connected to a line that carried an asphyxiating substance such as nitrogen or argon. From 1984 through 1995, 15 deaths related to coupling compatibility between airline respirators

and nonbreathable air supplies were identified.[16] The fatalities could have been prevented with proper training and compliance with existing coupling incompatibility regulations for airline respirators. To protect against this, the employer should ensure that air couplings of airline respirators are incompatible with outlets for nonrespirable worksite air or other gas systems. As indicated in Table 1, 42.9% of all *Agriculture, Forestry, and Fishing* establishments that use airline respirators allowed the use of hose couplings that were compatible with other air and other plant gases or did not know whether their airline respirator hose couplings were compatible with other air and other plant gases. This compatibility might prompt some *Agriculture, Forestry, and Fishing* establishments to examine their use of airline respirators because it can lead to the fatalities previously described.

CONCLUSION

The relatively high rates of indicators of potential inadequacies (Table 1) suggest widespread problems with respiratory protection programs in the *Agricultural Production—Crops* industry as well as other industries. Although there is always some potential for occasional misinterpretation of questions, it is unlikely that misinterpretations alone would be so widespread as to result in the rates shown in Table 1. Prior to mailing the questionnaires, the draft questionnaires were cognitively tested by BLS with representatives of establishments ranging in employment levels from small to large. The resulting final questionnaire should have been understood by persons moderately familiar with respiratory protection.

Clearly, there is room for improvement of the respiratory protection programs within the *Agricultural Production—Crops* industry. The fact that 69.5% of the establishments have at least 3 indicators of a potentially inadequate respiratory protection program, combined with known respiratory disease among certain agricultural workers, is significant. The potential for imminent danger associated with improper airline connections is also significant. The net effect is that workers may not be getting the full protection that can be offered by NIOSH-approved respirators. Employers who suspect that their respiratory protection program is in need of improvement should consider contacting the Occupational Safety and Health Administration (OSHA) free confidential consultation service available for small businesses in every state.[17] OSHA has a *Small Entity Compliance Guide for the Respiratory Protection Standard*[18] and the American Industrial Hygiene Association provides a list of consultants at www.aiha.org.

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